Overview

The HP StorageWorks 2000fc G2 Modular Smart Array (MSA2000fc) represents the newest Fibre Channel model of the MSA2000 family (which includes the MSA2000i iSCSI and the MSA2000sa SAS connected models), a new generation of HP storage arrays specifically designed for entry-level customers and features the very latest in functionality and technology at highly affordable price points.

The MSA2000fc G2 is a 4 Gb Fibre Channel connected 2U storage area network (SAN) or direct connect solution (OS dependent) designed for small to medium size departments or remote locations. The controller-less chassis is offered in two models - one comes standard with twelve Large Form Factor (LFF) 3.5-inch drive bays, the other can accommodate twenty-four Small Form Factor (SFF) 2.5-inch drives. Both are able to simultaneously support enterprise-class SAS drives and archival-class SATA drives. The chassis can have one or two MSA2300fc G2 controllers.

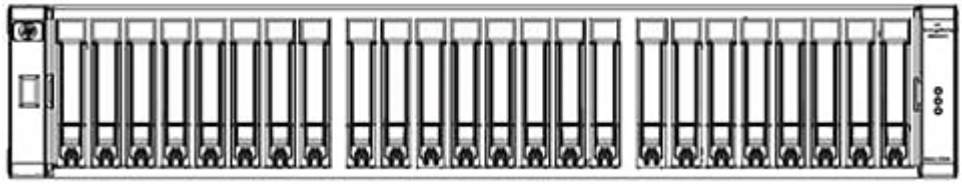
The MSA2000fc G2 is all about the ability to choose the proper configuration to fit individual needs. The user can opt for the 24-drive bay SFF chassis for the highest spindle counts in the most dense form factor, or go for the 12 drive bay LFF model to max out total capacity. Choose a single controller unit for low initial cost with the ability to upgrade later; or decide on a model with dual controllers for the most demanding entry-level situations. Capacity can easily be added when needed by attaching additional drive enclosures. Maximum capacity ranges with LFF drives up to 27 TB SAS or 60 TB SATA with the addition of the maximum number of drive enclosures. Configurations utilizing the SFF drive chassis and the maximum number of drive enclosures can grow to 29.7 TB of SAS or 24.7 TB of SATA with a total of ninety-nine drives. The MSA2000fc G2 has been fully tested up to 64 hosts. NOTE: There are no additional hidden charges, licenses or fees as you add enclosures or hosts and users.

The MSA2000fc G2 is a member of HP StorageWorks Modular Smart Array offerings, delivering simple and affordable storage technology to meet today's demanding and growing IT needs. These storage solutions offer excellent price/performance and availability features for direct attach configurations (depending on OS), clusters, workgroups and entry-level SAN environments. Each solution is designed to be easy to deploy, to be secure, along with low management costs, while driving rapid return on investment.

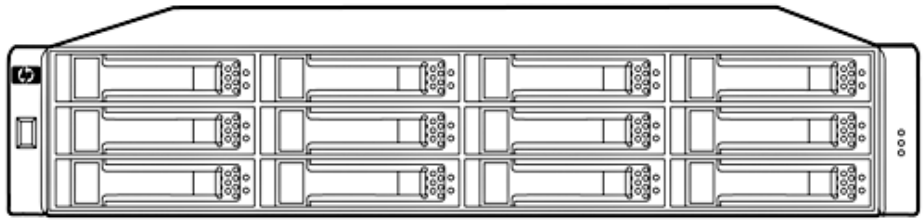
What's New

- Support for Small Form Factor (SFF) SAS and SATA drives, common with ProLiant
- Support for attachment of THREE dual I/O MSA70 SFF JBODs (ninety-nine SFF drives)
- Increased support to FOUR MSA2000 LFF disk enclosures with the MSA2312fc (sixty LFF drives)
- Support for new Small Form Factor 300 GB SAS drive - doubling the SFF SAS capacity
- Increased optional snapshot capability to 255 snaps
- Additional LUN support up to 512 total volumes in a Dual Controller system
- Adding support for HP-UX, OpenVMS, Windows, and Linux on powerful Integrity servers
- Availability of a carrier grade NEBS-certified DC-powered MSA2024 SFF chassis

Overview



HP StorageWorks 2024fc G2 Modular Smart Array



StorageWorks 2012fc G2 Modular Smart Array

Models

StorageWorks 2000fc G2 Modular Smart Array	Controller-less CHASSIS & MSA2300fc G2 FC Controller	
	HP StorageWorks 2012 Modular Smart Array 3.5-in Drive Bay Chassis (LFF) (Will accept one or two controllers or Disk Enclosure I/O modules)	AJ948A
	HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay Chassis (SFF) (Will accept one or two controllers)	AJ949A
	HP StorageWorks 2300fc G2 Modular Smart Array Controller	AJ798A
	Disk Enclosures	
	HP StorageWorks MSA2000 Single I/O 3.5-inch 12 LFF Drive Enclosure (w/ two .6m SAS to SAS cables) Used with single controller array head	AJ749A
	HP StorageWorks MSA2000 Dual I/O 3.5-inch inch 12 LFF Drive Enclosure (w/ two .6m SAS to SAS cables) Used with dual controller array head	AJ750A
	HP StorageWorks MSA2000 Drive Enclosure I/O Module (no cable included)	AJ751A
	HP StorageWorks MSA70 2.5-inch 25 SFF Drive Enclosure 2.5 in Drive Enclosure (single I/O, single domain) (w/one .5m miniSAS to miniSAS cable)	418800-B21
	HP StorageWorks Dual Domain I/O Module for MSA70 enclosure (upgrades MSA70 to dual domain) (w/ one .5m miniSAS to miniSAS cable)	AG779A
	MSA2300fc SAN Starter Kits	
	HP StorageWorks 2312fc G2 Single Controller Modular Smart Array SAN Starter Kit (LFF) (includes single controller, 12-drive bay LFF array head, 8-port 8Gb switch, two 8Gb HBAs, SFPs and cables)	AJ954A
	HP StorageWorks 2324fc G2 Single Controller Modular Smart Array SAN Starter Kit (SFF) (includes single controller, 24-drive bay SFF array head, 8-port 8Gb switch, two 8Gb HBAs, SFPs and cables)	AJ955A
	HP StorageWorks 2300fc G2 Modular Smart Array SAN Starter HA Upgrade Kit (includes additional single controller, 8-port 8Gb switch, two more 8Gb HBAs, SFPs and cables) For upgrading AJ954A or AJ955A to dual controller, high availability configurations	AJ956A

Configured Units

HP StorageWorks 2312fc G2 Dual Controller Modular Smart Array (LFF) (Pre-configured with two array controllers)	AJ795A
HP StorageWorks 2324fc G2 Dual Controller Modular Smart Array (SFF) (Pre-configured with two array controllers)	AJ797A

Controller-less Chassis: DC-powered units

HP StorageWorks 2012 Modular Smart Array 3.5-in Drive Bay DC-power Chassis (LFF) (can add one or two MSA2300fc G2 controllers or MSA2000 JBOD I/O modules)	AJ950A
HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay DC-power Chassis (SFF) (can add one or two MSA2300fc G2 controllers. No MSA2000 JBOD I/O module support)	AJ951A

Controller-less Carrier Grade Chassis

HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay Carrier-Grade Chassis (SFF)	AM337A

Related Option

HP StorageWorks 2000fc Modular Smart Array Controller (limited use) (for use only with an AJ948A LFF chassis for those needing to configure an older MSA2012fc. Only supports older features, functionalities. No SFF or MSA70 JBOD support, max 48 LFF drives, max 64 snaps; no HP-UX, OpenVMS, or Integrity server support)	AJ744A

Features and Benefits

Key Hardware Features

- Highly efficient consolidation and sharing of storage geared to departmental and small to medium business requirements
- Cost efficient plus high-availability choices
- Flexibility in drives: LFF MSA2 3.5-inch or HP ProLiant SFF 2.5-inch drives
- Enterprise-class SAS or archival-class SATA drives as the need and budget dictates
- Dual-ported SAS drives for enterprise needs
- Large capacity SATA drives for inexpensive archival storage
- Able to mix SAS and SATA drives within the same drive enclosure
- Choose either single or dual controller array models to fit the budget
- Choice of low cost single I/O or high-availability dual I/O drive enclosure models

Customer Benefits

- The HP StorageWorks 2000 Modular Smart Array family manages growing storage requirements across multiple HP ProLiant, Integrity, or a selection of PA-RISC servers for customers who need a centralized dedicated storage solution for applications (check model for specific server support). SANs allow for controlled, cost-effective growth and increased protection of data.
- Its ease of management allows a department or small company to effectively handle growing storage requirements with a minimum of complexity.
- Depending on the model chosen, the modular design allows the user to start relatively small but supports future growth to hundreds of users and up to 27 TB of LFF SAS or 60 TB of LFF SATA storage, or 29.7 TB of SFF SAS or 24.7 TB of SFF SATA storage.
- The optional controller-based snapshot and clone capability of the MSA2000 family allows the smaller departmental user or company to implement functionality once only available to much larger firms with expensive arrays. The MSA2300fc G2 controller supports up to 255 snaps.

HP MSA2000fc G2 Models At a Glance:

- High performance Modular Smart Array controller(s), each with two 4Gb Fibre Channel ports
- Single or dual controller capability
- 1 GB transportable cache per controller - battery-free cache backup with super capacitors and compact flash
- 512 LUNs with LUN size up to 16TB
- 2U rack mount chassis combining both the controller and disk shelf
- Twelve 3.5-inch or twenty-four 2.5-inch dual-ported SAS or SATA drive bays (supports mixing of drive types in a single shelf)
- Supports expansion to 4 additional LFF enclosures for a total of 60 LFF disks
- Supports expansion to 3 additional SFF enclosures (MSA70) for a maximum total of 99 SFF disks
- Redundant power supplies and fans are standard
- RAID levels 0, 1, 3, 5, 6, 10, 50
- Non-disruptive on-line controller code upgrade (requires dual controllers w/ multi-pathing software)
- Heterogeneous support for 32-bit and 64-bit Windows, Red Hat and SuSE Linux, and HP-UX
- Windows Server 2008 x64 Hyper-V, VMware
- Qualified and certified for Windows, Linux, and HP-UX and OpenVMS clustering
- Optional controller-based snapshot and clone functionality

Features and Benefits

HP MSA2024fc G2 Carrier-Grade Components	HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay Carrier-Grade Chassis	AM337A
	The MSA2000fc G2 is a 4 Gb Fibre Channel connected 2U storage area network (SAN) or direct connect solution designed for network equipment providers (NEPs) and communication service providers. Suited for those who need a robust telecom infrastructure--- they need storage devices to catch videos, photos, text, new services---need a place to have the data stored and cached. The MSA is a high-quality entry-level FC array, ideal for customers with limited budgets. The HP MSA2024 Carrier-Grade Chassis (AM337A) is a controller-less chassis capable of supporting one or two MSA2300fc G2 Fibre Channel controllers (AJ798A) and has twenty-four Small Form Factor (SFF) drive bays. It comes equipped with two DC-power power supplies. When used in conjunction with the Seismic cabinet (AH343A) and specific ProLiant SFF SAS drives, the solution is NEBS certified. NEBS level-3 certification provides the assurance that the equipment is safe to operate and sturdy enough to withstand certain physical (for example, acoustics) and environmental (for example, fire, earthquakes) conditions. Maximum capacity is achieved with twenty-four 146 GB drives yielding 3.5 TB in 2U of rack space. No JBODs or disk enclosures are part of the NEBS certification This Storage array augments HP's Carrier-Grade portfolio of solutions and will attach to both the Bladeserver and ProLiant carrier-grade rack mount servers.	
Certifications	NEBS Level 3 (GR-63 and GR-1089), Seismic Zone 4	
Controller	HP StorageWorks 2300fc G2 Modular Smart Array Controller (1 or 2)	AJ798A
Qualified Drives	HP 72GB 3G 10K SAS 2.5-inch SFF DP HDD	384842-B21
	HP 146GB 3G 10K SAS 2.5-inch SFF DP HDD	418367-B21
Racking	Order stand-alone or to be racked in HP seismic rack	
Mezz Card (HBA)	QLogic for BL460c	
	QLogic for BL860c	
Supported Interconnect	c7000-cg - Brocade SAN 4/12 and 4/24	
	For more information on HP Carrier Grade Platforms go to http://www.hp.com/products1/servers/carrier_grade/index.html?jumpid=reg_R1002_USEN	

	MSA2000fc G2	MSA2000i	MSA2000sa	Comparison w/ EVA4400
Capacity Minimum / with maximum additional drive enclosures	LFF: 5.4 TB SAS or 12 TB SATA w/ 4 drive enclosures: 27 TB SAS or 60 TB SATA SFF: 7.2 TB SAS or 6 SATA w/ 3 MSA70 JBODs: 29.7 TB SAS or 24.7 TB SATA	LFF: 5.4 TB SAS or 12 TB SATA w/ 3 drive enclosures: 21.6 TB SAS or 48 TB SATA (LFF only)	LFF: 5.4 TB SAS or 12 TB SATA w/ 3 drive enclosures 21.6 TB SAS or 48 TB SATA (LFF only)	LFF: 5.4 TB FC or 12 TB FATA w/ 8 drive enclosures 43 TB FC or 96 TB FATA (LFF only)
Controller Cache	1 GB per controller	1 GB per controller	1 GB per controller	2 GB per controller
Total LUNs	512	256	256	1024
Host connect MSA2000 have 1 or 2 controllers, EVA has 2 controllers standard	Two 4 Gb Fibre Channel ports per controller	Two 1 GbE iSCSI ports per controller	Two 3 Gb SAS ports per controller	Two 4 Gb Fibre Channel ports per controller (Ten w/switch)
Maximum Drives w/ expansion	60 LFF/99 SFF	48	48	96
Maximum host supported	64	16	4	512
Snapshot, clone	Snapshot (max 255) clone	Snapshot (max 64) clone	Snapshot (max 64) clone	Snapshot, clone, remote data replication
Use for Storage	Primary Storage with SAS. Secondary with SATA	Primary Storage with SAS. Secondary with SATA	Primary Storage with SAS. Secondary with SATA	Primary Storage with FC Secondary with FATA

NOTE: maximum available storage capacity depends on the RAID level being implemented, and is based on maximum number of LUNs and LUN size.

Product Technology

4 Gb Fibre Channel technology

Two host ports per controller, shipped with SFPs. the MSA2000fc G2 controller can run in either point-to-point or FCAL (loop). The default is FCAL which is used in Direct Connect, particularly with two controllers. The PtP (fabric) mode is used with almost all switches.

Modular Chassis

2U rack height. 12 Large Form Factor or 24 Small Form Factor drive bays, accommodating SAS and SATA. Comes with space for one or two controllers, or MSA2000 3.5-inch disk Enclosure I/O modules (LFF chassis only)

Drives available

The new MSA2000fc G2 controller supports either the MSA2 3.5-inch Large Form Factor (LFF) drives, or the HP ProLiant 2.5-inch Small Form Factor (SFF) drive

Serial Attached SCSI (SAS) enterprise-class drives designed for high volume, 24x7 usage. Serial-ATA (SATA) are usually reserved for archival of data as they are both relatively inexpensive and are available in very large capacities. The MSA2000 family of arrays can accommodate both SAS and SATA drives within the same enclosure making it ideal to have both business-critical, high activity files on SAS drives while using Snapshot or clone capability to keep back-up or archival data on the less expensive drives.

For investment protection, the MSA2300fc G2 controller will support single

port SAS & SATA drives in a single-domain MSA70. This support allows current owners of MSA70s to migrate their single port drives (in their MSA70 only) to be attached to an MSA2300fc. They can only cascade to another single I/O MSA70. This is not a data-in-place transition.
SAS drive performance can be approximately 30% greater than SATA performance on sequential host I/O. SAS performance excels in sequential lower latency response time and random I/O per second transaction performance due to higher rpm disk speeds yielding lower seek times. SAS drive random performance is generally twice that of SATA drives.
NOTE: MSA2 3.5-inch Large Form Factor (LFF) drives are for use only in the MSA2000 family. The 2.5-inch Small Form Factor (SFF) drives are supported only with the MSA2300fc G2 controller and are common with and are the same part numbers as the ProLiant optional 2.5-inch drives.

Optional Disk enclosures

Just as the user has a choice of chassis for the array head (LFF and SFF drive bays), so also do they have a choice of expansion disk enclosures accommodating either drive size. (NOTE: these are not supported as part of a NEBS-certified with the MSA Carrier Grade Chassis.)

MSA2000 3.5-inch drive enclosure. This 2U unit has twelve LFF (3.5-inch) drive bays and accepts for MSA2 dual-ported SAS and SATA drives. One model (AJ749A) has a single I/O module that matches with a single controller array head, giving a single path to the drives. The second model (AJ750A) comes standard with two I/O modules installed, required when paired with a dual controller array head, giving two paths to the drives for higher availability.

- This 3.5-inch drive enclosure can be attached to either the MSA2312fc or MSA2324fc array head. In addition it continues to support the MSA2000i and MSA2000sa.
- Each model ships standard with two .6m SAS to SAS cables for cascading to other MSA2000 drive enclosures
- For connection to either form-factor MSA2300fc array head, miniSAS to SAS cable(s) must be purchased.
- The single I/O model can be upgraded to a dual model with the purchase of an additional MSA2000 Drive Enclosure I/O module (AJ751A). No cable is included with this upgrade.
- Up to four MSA2000 3.5-inch enclosures can be attached to an MSA2300fc G2 controller in the array head.

MSA70 2.5-inch drive enclosure. This 2U storage enclosure (418800-B21) is designed to support twenty five ProLiant 2.5-inch Universal form factor (SFF) SAS or SATA hard drives. It ships standard with a single I/O module installed.

- This 2.5-inch drive enclosure can only be attached to an MSA2324fc G2 controller (SFF)array head. It cannot be attached to the MSA2312fc (LFF) or the MSA2000i or MSA2000sa models.
- The MSA70 enclosure ships with a single .5m miniSAS to miniSAS cable.
- To support a dual controller MSA2124fc G2 array head, the user needs to purchase and install an MSA70 Dual Domain I/O Module (AG779A). This option ships standard with an additional .5m miniSAS to miniSAS cable.
- Up to three MSA70s may be attached to the array head, given total

support for 99 SFF drives.

Scalability

The MSA2300fc G2 controller is designed to allow an installation to begin with smaller capacity and be able to grow gradually as needed. The flexibility of SAS or SATA drive technology, form factors, sizes, speeds, and costs per GB allows a system to easily fit in almost any budget.

- Large Form Factor configurations can scale up to 5.4 TB SAS or 12 TB SATA, expandable to 27 TB SAS or 60 TB SATA with the addition of a maximum of four MSA2000 3.5-inch Drive Enclosures.
- Small Form Factor configurations can scale from 7.2 TB SAS or 6 TB SATA. With the addition of three MSA70 JBODs, the MSA2324fc G2 can support 29.7 TB SAS or 24.7 TB SATA.
- Users may configure a 24-drive MSA2324fc G2 SFF array head with up to three 12-drive LFF MSA2000 3.5-inch disk enclosures. This is an excellent method for a configuration that support fast SFF enterprise-class SAS drives in the array head, combined with economical LFF drives staged for archival purposes, all in the same array.
- Qualification of larger capacity drives is ongoing.

LUNs

The MSA2000 family of arrays supports 512 LUNs (total volumes in a dual controller system) and LUN sizes up to 16 TB. The array supports expansion and deletion of any LUN.

RAID 0, 1, 3, 5, 6, 10, 50

In addition to the usual RAID levels, the MSA2000 family features several important additional levels. RAID 6 is the highest level of RAID protection. It allocates two sets of parity data across drives and allows simultaneous write operations. It can withstand two simultaneous drive failures without downtime or data loss. RAID 10 is mirroring and striping without parity. It is the most popular of the multiple RAID levels, allowing large arrays with high performance in most cases and superior fault tolerance. RAID 50 combines the block striping and parity of RAID 5 with the straight block striping of RAID 0, yielding higher performance than RAID 5 through the addition of RAID 0, particularly during writes.

Performance

Performance numbers are a guideline as established by tests using RAW I/O in an Operating System Agnostic test lab environment. A total of 96 72GB 15K SAS drives were used in a dual controller configuration of eight 12 Disk vdisks, eight 806 GB volumes, and two volumes per host. Four hosts directly attached to the MSA2000fc G2 were used in this test configuration (results cannot be expected with a single host). Results were achieved in Sequential Writes with 256K blocks; all random tests were based on 8K block sizes.
Number and type of applications, drive type, operating system used, and the number of hosts will affect overall performance.

Workload	MSA2300fc	MSA2000sa	MSA2000i
Host Connect	4 Gb Fibre Channel	3 Gb SAS	1GbE Ethernet
MSA2000 RAID 10 Performance Results (rounded)			
Random Reads IOPs	21,400	10,600	8,200
Random Writes IOPs	8,800	4,900	4,500
Random Mix IOPs 60/40 read/write	13,500	6,800	6,100
Sequential Reads MB	1,300	700	300
Sequential Writes MBs	560	350	260
MSA2000 RAID 5 Performance Results (rounded)			
Random Reads IOPs	20,500	10,200	7,800
Random Writes IOPs	2,400	2,000	1,600
Sequential Reads MBs	1,300	700	300
Sequential Writes MBs	780	380	270
Random Mix IOPs 60/40 read/write	5,900	3,300	3,200
MSA2000 RAID 6 Performance Results (rounded)			
Random Reads IOPs	20,500	10,100	7,800
Random Writes IOPs	1,600	1,400	1,200
Sequential Reads MBs	1,300	700	300
Sequential Writes MBs	820	380	270
Random Mix IOPs 60/40 read/write	4,500	2,750	2,560

DC-power chassis

HP is making the two models of controller-less chassis available with direct current (DC) power supplies. They each have the two empty bays where users can insert one or two MSA2300fc G2 controller(s). In addition, the MSA2012 LFF drive bay can have MSA2000 3.5-inch I/O modules inserted to create a LFF DC-power JBOD.
The 500 watt power supply is designed to operate over the input range of -40VDC to -75VDC. This is specifically intended to conform to Telco requirements. Certification is in process but no claims are made at this time.

HP StorageWorks 2012 Modular Smart Array 3.5-in Drive Bay DC-power Chassis (LFF)	AJ950A
HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay DC-power Chassis (SFF)	AJ951A

Configuration and Management Tools

HP StorageWorks MSA Storage Management Utility (SMU). Management access, out-of-band: WEB GUI, CLI. Interface Types: Mini DB9 RS232, 10/100 Ethernet Protocols Supported SNMP, SSL, SSH, SMTP, HTTP, Telnet

Hot Plug Expansion and Replacement Support

All MSA2000 models support hot plug expansion and replacement of redundant controllers, enclosures, fans, power supplies, and I/O modules for simple, fast installation and maintenance.

Snapshot and Clone

Optional controller based functionality. Offers higher levels of data protection, enabling an almost instant recovery from data failure or corruption. Offers alternative development testing of 'offline' production data and the ability to backup snapped/cloned data.

Overview	The MSA2000fc G2 comes integrated with web browser based software for storage and RAID management, setup, configuration and troubleshooting. This reduces the cost of ownership by reducing the training and technical expertise necessary to install and maintain your HP storage solution. The SPOCK database provides interoperability information for thousands of components and millions of component combinations. It is available to all users on the HP.com website. http://www.hp.com/storage/spock
Server Compatibility	Supports most HP ProLiant and Integrity servers including • HP ProLiant DL, ML • HP ProLiant c-Class Blade Servers • Integrity servers, IA64 & PA Risc
Industry Standard X86 servers support	• Supports most multi-vendor industry standard 32-bit Intel and AMD based (x86) servers. HP requires the Third-Party Server to be logo'd and listed on the Microsoft Windows Server Catalog. • Refer to the Microsoft website: http://www.microsoft.com/windows/catalog/server/ • HP StorageWorks Division recommends that the Third-Party Server Vendor is an active member of TSANet. Refer to the TSANet website for details: www.tsanet.com
OS Support (x86)	• Microsoft Windows Server 2008 IA32, x64, IA64 (Standard, Enterprise, Datacenter) • Microsoft Windows 2003 and 2003 R2 IA32, x64, IA64 • Red Hat Linux (32/64) • SuSE SLES (32/64) • Microsoft Windows Server 2008 x64 Hyper-V • VMware ESX 3.0.1, 3.0.2, 3.5
OS Support (Integrity, HP9000)	• HP-UX 11i V3 Integrity, HP9000 • HP-UX 11i V2 Integrity, HP9000 • OpenVMS 8.3. OpenVMS 8.3-1H1
Web Browser support	• MSA2000 support target based management, and includes a Web interface and a telnet interface, and requires a web browser for management. Only Microsoft Internet Explorer V6.X and above (Internet Explorer V7.X is strongly encouraged), and Mozilla Firefox 1.0.7 or later are supported

MSA2300 Snapshot and Volume Copy Software

Product Features

Data Protection

- Snapshots create up to 255 point-in-time pictures of data
- Volume Copies create up to 128 point-in-time copies of data
- Recovery is instant - revert data from any previous Snapshot or Volume Copy
- Backup 'snapped' data to disk, virtual tape, or physical tape without a backup window

Data Testing

- Snap or clone data to test the performance of a software application on 'offline' production data
- Snap or clone data to test how a software patch or enhancement will function on 'offline; production data

HP StorageWorks 2000 Modular Smart Array Snapshot 255 Software LTU[1]	T5539A
HP StorageWorks 2000 Modular Smart Array Snapshot 64 Software LTU	T5512A
HP StorageWorks 2000 Modular Smart Array Snapshot 8 Software LTU	T5513A
HP StorageWorks 2000 Modular Smart Array Snapshot 8/255 Upgrade Software LTU[1]	T5540A
HP StorageWorks 2000 Modular Smart Array Snapshot 64/255 Upgrade Software LTU[1]	T5541A
HP StorageWorks 2000 Modular Smart Array Snapshot 8 to 64 Upgrade Software LTU	T5515A
HP StorageWorks 2000 Modular Smart Array Volume Copy Software LTU	T5514A

[1] The snapshot software is supported on the MSA2324 and MSA2312 (G2) models only

Path failover (MPIO)

MPIO Basic Failover for Windows provides a single multi-path solution for HP StorageWorks MSA2000fc Modular Smart Array on HP ProLiant servers by providing basic path failover. Supports Windows 2003, Windows 2003 R2, and Windows 2003 X64 operating systems.

- HP MPIO Full Featured DSM for MSA2000fc v2.2.0.22
- Microsoft Windows 2008: Microsoft MPIO is bundled with Windows Server 2008 and must be installed as an operating system feature.
- Failover support for Linux is with Device Mapper 4.0.
- HP-UX PV-Links

HP StorageWorks Storage Mirroring

HP StorageWorks Storage Mirroring Software provides host-based, continuous replication for customers seeking a low-cost alternative to fabric or array-based replication. Patented replication and failover technology continuously captures byte-level data changes as they happen and replicates those changes to one or more target servers at any location without geographic limitations. By replicating only the bytes that change, Storage Mirroring Software uses the absolute minimum bandwidth on your existing LAN or WAN to replicate your data. Storage Mirroring also provides server failover where a production server can automatically be 'replaced' by the storage mirroring server in the event of failure. Couple Storage Mirroring with MSA2000 Snapshots and/or Volume Copy to achieve an Enterprise class data protection strategy creating different data recovery points using continuous data protection with Storage Mirroring and point-in-time data protection with Snapshots and/or Volume Copy.
Storage Mirroring Software supports:

- Any DAS, NAS, and SAN storage device.

- Any Windows or Linux ProLiant server including all ML, DL, and BL platforms
- Many Windows platforms including Windows Server 2000, Windows Server 2003, Windows Server 2003 R2, Windows Storage Server 2003, Windows Storage Server 2003 R2, 64bit Windows, and Windows on Itanium
- Some Linux platforms including Red Hat Linux Enterprise 4.4-4.6, 5.x

For more information visit http://h18006.www1.hp.com/products/storage/software/sm/index.html

HP StorageWorks Storage Mirroring Software Windows Server Edition 1 LTU	T5438A
HP StorageWorks Storage Mirroring Software Windows Enterprise Server Edition 1 LTU	T5440A
HP StorageWorks Storage Mirroring Software Windows NAS Edition 1 LTU	T5442A
HP StorageWorks Storage Mirroring Software for AiO Edition 1 LTU	T5446A
HP StorageWorks Storage Mirroring Software for 5 Virtual Machines 1 LTU	T5444A
HP StorageWorks Storage Mirroring SW Linux 1 LTU	T5448A
HP StorageWorks Storage Mirroring Virtual Infrastructure 1 LTU	T5450A

NOTE: For more information visit http://h18006.www1.hp.com/products/storage/software/sm/index.html

HP ProLiant Storage Server gateways: Add more value to your MSA array

Stretch your MSA2000 array investment by adding file & print services, iSCSI connectivity, and management hosting with a ProLiant Storage Server gateway platform. HP ProLiant Storage Servers are optimized file and print server solutions that are built on industry-standard HP ProLiant servers and come with either Microsoft Windows Storage Server 2003 R2 or Windows Unified Data Storage Server 2003 operating system pre-installed. Since they're Windows-based, network integration is easy, your tools and data protection applications run right on the box, and management has a familiar look and feel. Like many Network Attached Storage (NAS) devices, they support heterogeneous file serving environments and are pre-configured to install in minutes.
A DL380 G5 x64 SAN Storage Server is a file/iSCSI gateway that adds IP-based services to your Fibre Channel array or SAN. So it not only enhances your MSA investment with file and print services, but it helps you save even more by enabling tiered (Fibre Channel and iSCSI) block access for application servers. All of your important client and server data can be managed, scaled, and protected on a single MSA2000 array.

NOTE: For more information visit: http://www.hp.com/go/storageservers

HP ProLiant DL380 G5 Base Storage Server NOTE: Microsoft Windows Storage Server 2003 R2 Standard x64 Edition O/S with file/print services on a 2U rack form factor platform. For more information, go to: http://h18006.www1.hp.com/products/quickspecs/12559_div/12559_div.html	AG815B
HP ProLiant DL380 G5 SAN Gateway Storage Server NOTE: Microsoft Windows Unified Data Storage Server 2003 Enterprise x64 Edition O/S with file/print, iSCSI, and cluster services on a 2U rack form factor platform. For more information, go to: http://h18006.www1.hp.com/products/quickspecs/12559_div/12559_div.html	AG771B
HP ProLiant SB460c SAN Gateway Storage Server NOTE: Microsoft Windows Unified Data Storage Server 2003 Enterprise x64 Edition O/S with file/print, iSCSI, and cluster services on a blade form factor platform. For more information, go to: http://h18006.www1.hp.com/products/quickspecs/13114_div/13114_div.html	AN583A

Fibre Channel HBA options for DL380 G5 Storage Servers

Optional Software

HP StorageWorks FC2142SR 4Gb PCIe HBA	A8002A
HP StorageWorks FC2242SR Dual Channel 4 Gb PCIe HBA	A8003A
HP StorageWorks FC1142SR 4Gb PCIe HBA	AE311A
HP StorageWorks FC1242SR Dual Channel 4 Gb PCIe HBA	AE312A
HP StorageWorks 81Q PCI-e FC HBA	AK344A
HP 82Q 8Gb Dual Port PCI-e FC HBA	AJ764A
HP StorageWorks 81E 8Gb SP PCI-e FC HBA	AJ762A
HP 82E 8Gb Dual-port PCI-e FC HBA	AJ763A
Fibre Channel HBA options for the SB460c SAN Gateway Storage Server	
Emulex LPe1105 FC Dual Channel 4Gb, PCI-E-to-Fibre Channel Host Bus Adapter	403621-B21
QLogic QMH2462 4Gb FC HBA for HP c-Class BladeSystem	403619-B21

Warranty

- Three-year limited warranty
- Three years parts exchange
- Next Business day delivery

Enclosures, Hard drives, and Options for the MSA2000fc carry their own warranty. Refer to HP's Limited Warranty Statement for more information.

The MSA2000fc has been designed with customer self repairable parts to minimize repair time and provide greater flexibility in performing defective parts replacement. Please refer to HP's limited warranty Statement and parts replacement instructions for further details.

http://h18006.www1.hp.com/products/storageworks/warranty.html

Products included in various Kits carry their own individual warranties.

NOTE: The warranty of the hard drive options purchased with the MSA2000fc product is different for SAS hard drives versus SATA hard drives. SAS hard drive options have a three year warranty and SATA hard drives options have a one year warranty.

HP Care Pack Services. Scalable, Flexible, Dependable. Like your storage.

Your storage is evolving. Get scalable support that evolves with it. HP Care Pack Services is an easy-to-buy, easy-to-use portfolio of packaged services covering your lifecycle needs. You can rely on our highly skilled, HP certified professionals to offer a breadth of expertise across leading storage technologies, and work side by side with you for optimal results. Push services beyond expectations and choose support that meets the changing needs of your business with the same reliability, scalability and flexibility you demand of your storage.

Protect your business beyond the warranty

Standard warranty protects against product defects and some causes of downtime. HP Care Pack Services helps you proactively guard against unplanned downtime which can reduce your productivity and profitability. By using a standard approach to warranty uplifts, such as HP Care Pack Services, customers can be more sure of consistency of operations for both mission-critical and standard business computing.

Extending warranties with HP Care Pack Services

The key to normalizing the warranty of combined solutions-is making service uplift simple: HP Care Pack Services. This portfolio of predefined packages, extending across the entire IT lifecycle, offering consulting, education, technical support, optimization, risk assessment, and more. It's entirely flexible allowing customers to extend the cover to the precise level of support required. Customer's standard hardware warranty, for example, can be upgraded to next-business-day response, to same-day coverage, or even to a committed six-hour call-to-repair service available 24 hours every day of the week.

- Provide consistent, predictable levels of support across your entire department or business
- Give you direct access to proven technical and problem-solving expertise
- Offer a choice of response-time and repair-time commitments
- Are available whenever and wherever you do business

For many products, post-warranty HP Care Pack Services are available when your original warranty has expired. Choose the support levels that meet your business requirements, from basic to mission-critical. http://www.hp.com/hps/storage

Service and Support, HP Care Pack, and Warranty Information

NOTE: Care Pack Services availability may vary by product and country.

Related Services	Services that will enhance the user experience in many product deployments	
	HP SAN Solution Service	Get your SAN implementation right - right from the start. Storage has become essential to the growth and agility of your business. That's why choosing an HP SAN as your data management solution is a smart business decision. But your SAN can deliver the results you need only if it is implemented correctly and integrated with your business. SAN installation, startup, and integration call for specialized expertise in planning and design, hardware configuration, network software installation, and operability verification. Your SAN needs to be configured for high performance and availability. And it needs to be integrated with your applications, management environment, and business processes.
	HP Data Migration Service	Minimize the risks involved in transferring data to your HP StorageWorks SAN. You need to move your critical enterprise data to your new HP StorageWorks SAN platform. And you need to accomplish that without losing data. And without interrupting your ongoing business operations. HP Data Migration Service helps you lessen the risk of data loss, minimize threats to data integrity, and avoid productivity-sapping performance slowdowns during data transport. A highly experienced HP Services storage specialist works with you to rapidly and securely migrate mission-critical business information across your data center or around the globe - regardless of the complexity of your environment.
	HP Backup & Recovery Solution Service - ISV	This service consists of installation of the ISV backup software for the supported SAN environment per HP's and the ISV's quality standards by a trained service specialist. HP Backup and Recovery Solution Service for ISV Backup Software provides for the implementation of the supported ISV backup software in a SAN environment. The two levels of service described here are based on the size and complexity of the backup environment. This service is available for VERITAS NetBackup, VERITAS Backup Exec, CommVault Galaxy, and Legato NetWorker. Implementation of CommVault Galaxy is only available as a Level 3 service.

eSupport

HP eSupport is a portfolio of technology-based services that assist you with managing your business environment - from the desktop to the data center.

Support Portal
The HP support portal provides one-stop access to the information, tools and services you need to manage the daily operations of your IT environment.
Features include:

- Access to self-solve tools (including search technical knowledge base)
- Efficient logging and tracking of support cases
- Collaboration with other business and IT professionals
- Download of patches and drivers
- Access to diagnostic tools
- Proactive notification of relevant information

Access to certain features of the support portal requires an HP service agreement. To access the support portal, visit: http://www.hp.com/support

Remote Support Technology (RST)-HP Remote Support Pack
Taking a more proactive approach to IT support, the HP Remote Support pack plug-in module easily integrates with HP Systems Insight Manager to provide a powerful, unified "single pane of glass" solution for onsite and remote management.

HP Remote Support Pack enhances HP Systems Insight Manager with intelligent event diagnosis plus the automatic submission of hardware event notifications securely to HP support, including acknowledgment and status returns. It adds remote configuration collections to allow the delivery of assessment and proactive services for your SAN storage and HP-UX environments.

Customer Technical Training

Consider education as an integral part of your strategy to get the best return on investment for your HP storage solution. HP offers a variety of training courses on storage software, networking, archiving and disk storage systems. Our classes are available in many delivery modalities from traditional instructor-led courses at one of our 80 training centers worldwide to on-site training customized to your needs or online. www.hp.com/learn/storage

---

HP Services Awards

HP Services continues to be recognized for service and support excellence by customers, partners, industry organizations and publications around the world. Recent honors and award reflect our services team's dedications, technical expertise, professionalism and uncompromising commitment to customer satisfaction. For a list of all our awards, please visit http://h20129.ww2.hp.com/services/cache/77318-0-0-225-121.html.

Additional Services Information

For more information about HP Care Pack Services for Storage, please visit:
http://www.hp.com/hps/storage

If you have specific questions, contact your local HP representative. Contact information for a representative in your area can be found at "Contact HP" http://www.hp.com

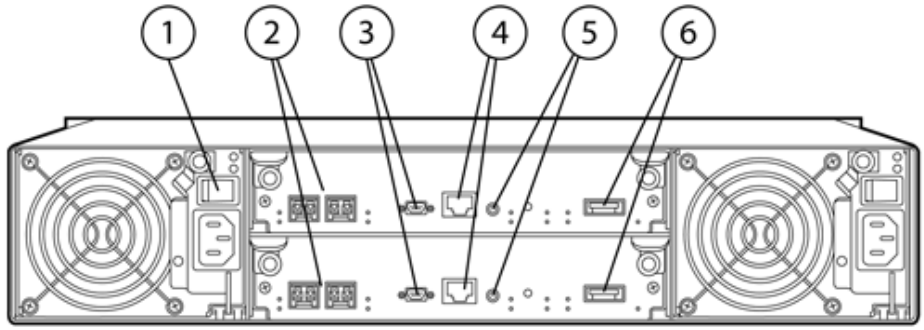
---

Warranty Upgrade Options

- Response - Upgrade on-site response from next business day to same day 4-hour response or 6 Hour Call To Repair
- Coverage - Extend hours of coverage from next business day to 9 hours x 5 days to 24 hours x 7 days
- Duration Select duration of coverage for a period of 1, 3, 4 or 5 years

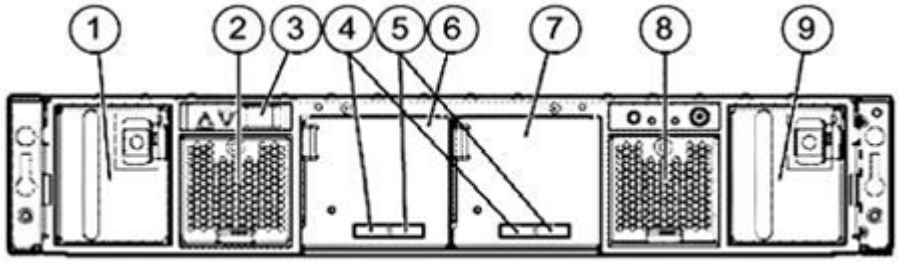
Software Product Services

Product support provides the customer access to HP's experienced technical support resources, as well as access to HP's Information Services database for support on a variety of multi-vendor/multiplatform software products. Product support includes escalation and problem coordination with the appropriate engineering group. HP Services offer a variety of options to allow you to tailor your product service to meet the needs of your organization. Basic warranty on products can be uplifted from day one to ensure you receive the service you need when you need it.



Dual Controller MSA2000fc G2

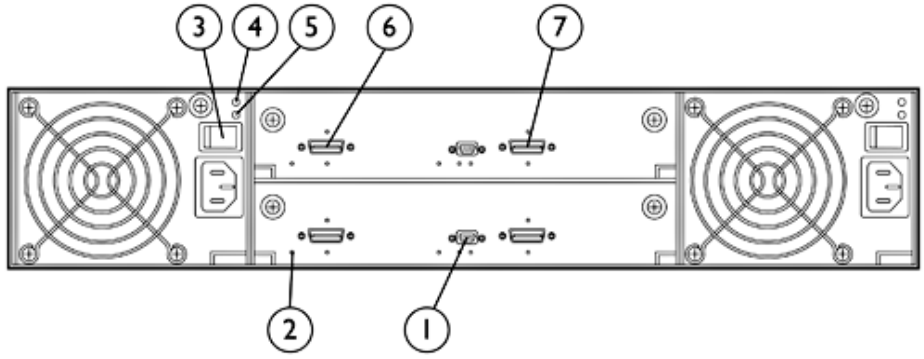
1. Power Switch
2. Fibre Channel Ports
3. CLI Port
4. Ethernet Ports
5. Service Ports
6. Expansion Ports



MSA70 Dual I/O 2.5-inch 25 Drive Enclosure

Rear Panel components

1. Power Supply 1
2. System fan 1
3. Dual 7 segment display board (for future use)
4. SAS in connector
5. SAS out connector
6. I/O module bay
7. I/O module bay
8. System fan 2
9. Power supply 2



MSA2000 Dual I/O 3.5-inch 12 Drive Enclosure

Rear Panel components

1. Service Port
2. Unit Locator
3. Power Switch
4. DC Voltage / Fan Fault
5. AC Power Good
6. SAS In Port
7. SAS Out Port

Configure to Order Program Information

HP introduces the new Configure to Order program for the MSA2000 family The MSA2000 models and options may or may not be factory installed in a rack with add-on controllers, switches, hubs, MSA2000 disk enclosures and hard drives. The MSA2000 arrays may be integrated with ProLiant servers or as standalone storage.
Orders to be shipped through the CTO process must have a minimum of two drives ordered per controller. SAN Starter Kits are not eligible for CTO. The Small Form Factor 300GB drive is not available for rack-level CTO at this time.

Description	Product #
HP StorageWorks 2012 Modular Smart Array 3.5-in Drive Bay Chassis (LFF)	AJ948A#0D1
HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay Chassis (SFF)	AJ949A#0D1
HP StorageWorks 2300fc G2 Modular Smart Array Controller	AJ798A#0D1
HP StorageWorks 2312fc G2 Dual Controller Modular Smart Array (LFF)	AJ795A#0D1
HP StorageWorks 2324fc G2 Dual Controller Modular Smart Array (SFF)	AJ797A#0D1
HP 2000fc Modular Smart Array Controller (ONLY for use by those wishing to build an older model MSA2012fc))	AJ744A#0D1
HP MSA2000 3.5in Single I/O 12 Drive Encl	AJ749A#0D1
HP MSA2000 3.5in Dual I/O 12 Drive Encl	AJ750A#0D1
HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay Carrier-Grade Chassis	AM337A#0D1
HP StorageWorks 2012 Modular Smart Array 3.5-in Drive Bay DC-power Chassis (LFF)	AJ950#A0D1
HP StorageWorks 2024 Modular Smart Array 2.5-in Drive Bay DC-power Chassis (SFF)	AJ951A#0D1
HP MSA2000 Drive Enclosure I/O Module (for CTO, only available for use in a AJ950A DC-powered chassis)	AJ751A#0D1
HP MSA2 146GB 3G 15K 3.5-inch SAS HDD	AJ735A#0D1
HP MSA2 300GB 3G 15K 3.5 inch SAS HDD	AJ736A#0D1
HP MSA2 450GB 3G 15K 3.5 inch SAS HDD	AJ737A#0D1
HP MSA2 500GB 7.2K 3.5 inch SATA HDD	AJ738A#0D1
HP MSA2 750GB 7.2K 3.5 inch SATA HDD	AJ739A#0D1
HP MSA2 1TB 7.2K 3.5 inch SATA HDD	AJ740A#0D1

MSA70	Single I/O, single domain 25 Small Form Factor (SFF) drive bays	418800-B21
MSA70 I/O Module	HP StorageWorks Dual Domain I/O Module	AG779A
	Makes the standard MSA70 (above) into a dual I/O, dual domain JBOD NOTE: The I/O Module is a field upgradeable Option Kit the addition of which in the MSA70 will allow dual domain capability providing higher level of redundancy and reliability	
SAS Drives (SFF 2.5-inch)	HP 72GB 3G 10K SAS 2.5-inch SFF DP HDD	384842-B21
	HP 146GB 3G 10K SAS 2.5-inch SFF DP HDD	418367-B21
	HP 300GB 3G 10K SAS 2.5-inch SFF DP HDD	492620-B21
	HP 36GB 3G 15K SAS 2.5-inch SFF DP HDD	418369-B21
	HP 72GB 3G 15K SAS 2.5-inch SFF DP HDD	418371-B21
	HP 146GB 3G 15K SAS 2.5-inch SFF DP HDD	504062-B21

	NOTE: Only Dual Port (DP) drives will work as dual-port in a Dual Domain environment. Dual Domain environment requires the HP StorageWorks Dual Domain I/O Module Option (# AG779A).	
SATA Drives (SFF 2.5-inch)	HP 60 GB 1.5 G SATA 5.4K 2.5-inch SFF HDD	379306-B21
	HP 120 GB 1.5G SATA 5.4K 2.5-inch SFF HDD	458924-B21
	HP 250 GB 3G 5.4K 2.5-inch SFF SATA ETY HDD	460355-B21
	NOTE: SATA drives for the MSA70 are not dual port (DP) drives. NOTE: Go to the HP Hard Drive Compatibility table for complete drive compatibility information (http://www.hp.com/products/harddiskdrives). Using hard drives in unsupported configurations will result in voiding the warranty and could result in damage to the drive and/or loss of data.	

Step 1 - MSA2000fc G2 - Base Configuration

Select one:

Model Name	Model Description:	Part Number
HP StorageWorks 2012 Modular Smart Array 3.5-inch Drive Bay Chassis	Controller-less chassis with twelve Large Form Factor (LFF) MSA2 drive bays. Space for two controllers.	AJ948A
HP StorageWorks 2024 Modular Smart Array 2.5-inch Drive Bay Chassis	Controller-less chassis with twenty-four Small Form Factor (SFF) ProLiant drives bays. Space for two controllers.	AJ949A

There are two array-head chassis - one with twelve 3.5-inch large form factor bays, the other with twenty-four 2.5-inch small form factor drive bays. For additional twelve additional drive bays purchase an MSA2000 3.5-inch Disk Enclosure. You may attach a total of four MSA2000 Drive Enclosures for a total of sixty LFF drive bays. For 25 additional SFF drive bays purchase an MSA70 JBOD with the 2nd I/O module. You may attach a total of three MSA70 JBODs for a total of ninety-nine SFF drive bays. Single controller arrays support Single I/O Disk Enclosures; dual controller arrays support Dual I/O Disk Enclosures.

Step 2 - Options

Select each option with quantities specified.

Step 2a - Options

Description with Parts Shipped:	Quantity	Part Number
HP StorageWorks 2300fc G2 Modular Smart Array Controller (for either the LFF MSA2012, SFF MSA2024, or the two DC-powered chassis)	1 or 2	AJ798A

Step 2b - SAS and SATA Drive Options

NOTE: SATA drives are designed for archival or reference data. They should not be used in a heavy or intense I/O environment. Those situations require the use of enterprise-class SAS drives. MSA2 3.5-inch drives are for use only with MSA2000 products.

MSA2 Large Form Factor (LFF) SAS drives for MSA2312fc and MSA2000 3.5-inch Disk Enclosure

HP StorageWorks MSA2 146GB 3G 15K 3.5 inch Dual-port SAS LFF HDD	AJ735A
HP StorageWorks MSA2 300GB 3G 15K 3.5 inch Dual-port SAS LFF HDD	AJ736A
HP StorageWorks MSA2 450GB 3G 15K 3.5 inch Dual-port SAS LFF HDD	AJ737A

MSA2 Large Form Factor (LFF) SATA drives for MSA2312fc and MSA2000 3.5-inch Disk Enclosure

Configuration Information

HP StorageWorks MSA2 500GB 7.2K 3.5-inch SATA LFF HDD	AJ738A
HP StorageWorks MSA2 750GB 7.2K 3.5-inch SATA LFF HDD	AJ739A
HP StorageWorks MSA2 1TB 7.2K 3.5-inch SATA LFF HDD	AJ740A
ProLiant Small Form Factor (SFF) SAS drives for MSA2324fc G2 and MSA70 JBOD	
HP 72GB 3G 10K 2.5-inch SAS SFF DP HDD	384842-B21
HP 146GB 3G 10K 2.5-inch SAS SFF DP HDD	418367-B21
HP 300GB 3G 10K SAS 2.5-inch SFF DP HDD (not supported for rack-level CTO at this time)	492620-B21
HP 36GB 3G 15K 2.5-inch SAS SFF DP HDD	418369-B21
HP 72GB 3G 15K 2.5-inch SAS SFF DP HDD	418371-B21
ProLiant Small Form Factor (SFF) SATA drives for MSA2324fc G2 and MSA70 JBOD	
HP 60 GB 1.5 G 5.4K 2.5-inch SATA SFF HDD	379306-B21
HP 120 GB 1.5G 5.4K 2.5-inch SATA SFF HDD	458924-B21
HP 250 GB 3G 5.4K 2.5-inch SFF SATA ETY HDD	460355-B21

Step 2c - Drive Enclosure Options

Should you want a drive enclosure, the model you choose depends on which array model it attaches to. If it is a single controller array, then choose the JBOD designated as "Single I/O". If it is attaching to a dual controller array then choose the "Dual I/O" JBOD

HP StorageWorks MSA2000 Single I/O 3.5-inch 12 Drive Enclosure (use with single controller array heads. Ships with two .6m SAS to SAS cables)	AJ749A
HP StorageWorks MSA2000 Drive Enclosure I/O Module (Use to upgrade the Single I/O model to dual I/O. No cable included)	AJ751A
HP StorageWorks MSA2000 Dual I/O 3.5-inch 12 Drive Enclosure (use with dual controller array heads. Ships with two .6m SAS to SAS cables)	AJ750A
HP StorageWorks 70 Modular Smart Array (MSA70) SFF 2.5-inch drive Single I/O JBOD Single I/O, single domain. 25 Small Form Factor (SFF) drive bays (use only with MSA2324fc array head. Includes one miniSAS to miniSAS cable)	418800-B21
HP StorageWorks Dual Domain I/O Module for MSA70 Makes the standard MSA70 (above) into a dual I/O, dual domain JBOD (Includes one miniSAS to miniSAS cable)	AG779A

MSA70 NOTE: Only Dual Port (DP) drives will work in the Dual Domain environment. Dual Domain environment requires the HP StorageWorks Dual Domain I/O Module Option (# AG779A).
For more information on the MSA70, go to the MSA70 Home Page:
http://h18006.www1.hp.com/storage/disk_storage/msa_diskarrays/drive_enclosures/msa70/index.html

Step 2c - SAS Cable Options

miniSAS to miniSAS Cables:
Connecting MSA2300fc controller to MSA70 JBOD if a longer cable is desired.

HP Ext miniSAS to miniSAS 1m Cable	407337-B21
HP Ext miniSAS to miniSAS 2m Cable	407339-B21

SAS to miniSAS Cables:
Connecting MSA2300fc controller to MSA2000 3.5-inch Disk Enclosure

HP SAS to miniSAS .5m Cable	419569-B21

Configuration Information

HP SAS to miniSAS 1m Cable	419570-B21
HP SAS to miniSAS 2m Cable	419571-B21

SAS Cables (SAS to SAS)
Older MSA2000fc controller to MSA2000 3.5-inch Disk Enclosure or cascading two MSA2000 3.5-inch Disk Enclosures if included .6m cables is not of sufficient length

HP Ext SAS to SAS 1m Cable	389665-B21
HP Ext SAS to SAS 2m Cable	389668-B21

Step 3 - Other MSA2300fc Options

Description	Quantity	Part Number
1st generation HP StorageWorks 2000fc Modular Smart Array Controller (older version)	1 or 2	AJ744A

(ONLY for those desiring to configure an older MSA2012fc by using the MSA2012 chassis and installing either one or two of this model controller. The resulting array head will have the attributes of the first generation MSA2012fc with no support for SFF drives, no HP-UX, limited total drive count, limited snaps, etc.)

Choose optional Power Cord for Non-U.S. Configurations
NOTE: Shipped standard with all units.
2 ea. Power Cord, 110/220 VAC, US/Canada/Mexico 227099-001

Power Cord, 220/240 VAC, (US/Canada/Mexico)	2	227099-001
Power Cord, (Australia/China/New Zealand)	2	227098-001
Power Cord, (Central Europe)	2	157215-001
Power Cord, (United Kingdom/Hong Kong)	2	157216-001
Power Cord, (Switzerland)	2	157219-001
Power Cord, (Italy)	2	157217-001
Power Cord, (Denmark)	2	157218-001
Power Cord, (Japan)	2	139867-001
Power Cord, (South East Asia/India)	2	157220-001

Management Cable

HP MSA2 DB9 Controller Management cable	AP761A

Step 4 - Choose Supported Options For Fibre Channel Infrastructure

Fibre Channel Host Bus Adapters - X86 servers	Model	Description	Part Number
	FC2242SR	4Gb PCI-E Dual Channel HBA for Windows and Linux	A8003A
	FC2142SR	4Gb PCI-E for Windows and Linux	A8002A
	FC2243	4Gb PCI-X Dual Channel for Windows and Linux	AD168A
	FC2143	4Gb PCI-X 2.0 for Windows and Linux	AD167A
	FC1242SR	4Gb PCI-E Dual Channel HBA for Windows and Linux	AE312A
	FC1142SR	4Gb PCI Express HBA for Windows and Linux	AE311A
	FC1243	4Gb PCI-X 2.0 Dual Channel for Windows and Linux	AE369A
	FC1143	4Gb PCI-X 2.0 for Windows and Linux	AB429A
	Bladeserver HBA	Lpe1105-HP 4Gb FC HBA for HP c-Class BladeSystem	403621-B21

	Bladeserver HBA	QMH2462 4Gb FC HBA for HP c-Class BladeSystem Windows and Linux	403619-B21
	Bladeserver HBA	QLogic QMH4062 1GbE iSCSI Adapter for HP BladeSystem c-Class, Windows and Linux	488074-B21
	81E	StorageWorks 8Gb, PCIe to Fibre Channel Host Bus Adapter for Windows, Windows Server, and Linux	AJ762A
	82E	StorageWorks 8Gb, PCIe to Fibre Channel Host Bus Adapter for Windows, Windows Server, and Linux	AJ763A
	81Q	StorageWorks 8Gb, PCIe to Fibre Channel Host Bus Adapter for Windows, Windows Server, and Linux	AK344A
	82Q	StorageWorks 8Gb, Dual Channel PCIe to Fibre Channel Host Bus Adapter for Windows, Windows Server, and Linux	AJ764A
Fibre Channel Host Bus Adapters - Integrity, PA-Risc servers	Integrity and HP9000 HP-UX v3 and v2	HP PCI-X 2.0 1Port 4Gb	AB378B
	Integrity and HP9000 HP-UX v3, and v2	HP PCI-X 2.0 2Port 4Gb Fibre Channel HBA	AB379B
	Integrity HP-UX v3 and v2	HP PCIe 2Port 4Gb Fibre Channel HBA	AD300A
	Integrity server blades BL860c and BL870c HP-UX v3 and v2	HP BLc QLogic QMH2462 FC HBA Opt Kit	403619-B21
	Integrity HP-UX v3 and v2	HP PCIe 1Port 4Gb Fibre Channel HBA	AD299A
	Integrity HP-UX v3 and v2	HP PCIe 2-Port 4Gb Fibre Channel HBA	AD335A
	Integrity server blades BL860c and BL870c HP-UX v3	HP BLc Emulex LPe1105 FC HBA Opt Kit	403621-B21
	Integrity HP-UX v3	HP PCIe 1p 4Gb FC and 1p 1000BT Adapter	AD221A
	Integrity HP-UX v3	HP PCIe 2p 4Gb FC and 2p 1000BT Adapter	AD222A
	Integrity HP-UX v3	HP PCIe 2p 4Gb FC and 2p 1000BSX Adapter	AD393A
	Integrity and HP9000 HP-UX v3 and v2	PCI-X 2Gb Fibre Channel/1000Base-SX HBA	A9782A
	Integrity and HP9000 HP-UX v3 and v2	HP PCI-x 1p 4Gb FC and 1p 1000BT Adapter	AD193A
	Integrity and HP9000 HP-UX v3 and v2	HP PCI-x 2p 4Gb FC and 2p 1000BT Adapter	AD194A
Fibre Channel Switches	Brocade 4/12 SAN Switch for HP c-Class Blade System, Base		AE370A
	Brocade 4/24 SAN Switch for HP c-Class Blade System, Full Fabric		AE372A
	Brocade 4/24 SAN Switch for HP c-Class Blade System, Power Pack		AE371A

HP StorageWorks 4/8 Base SAN Switch	A7984A
HP StorageWorks 4/16 SAN Switch	A7985A
HP StorageWorks 4/16 SAN Switch Power Pack	A7987A
HP StorageWorks 4/8 SAN Switch	A8000A
HP StorageWorks 4/32B Base SAN Switch	AG756A
HP StorageWorks 4/32B Full SAN Switch	AG757A
HP StorageWorks 4/32B Power Pack SAN Switch	AG758A
HP StorageWorks 8/8 Base SAN Switch	AM866A
HP StorageWorks 8/8 SAN Switch	AM867A
HP StorageWorks 8/24 Base SAN Switch	AM868A
HP StorageWorks 8/40 Base SAN Switch	AM869A
HP StorageWorks 8/40 Power Pack+ SAN Switch	AM870A
HP StorageWorks 8/80 Power Pack+ SAN Switch	AM872A
HP StorageWorks 8/80 Base SAN Switch	AM871A
HP StorageWorks 4/256 SAN Director	A7988A
HP StorageWorks 4/256 Power Pack SAN Director	A7989A
HP StorageWorks DC SAN Backbone Director	AK857A
Brocade 8/12c SAN Switch for HP BladeSystem c-Class	AJ820A
Brocade 8/24c SAN Switch for HP BladeSystem c-Class	AJ821A
Brocade 8/24c SAN Switch for HP BladeSystem c-Class Power Pack+	AJ822A
8 Gb Simple SAN Connection	
HP StorageWorks 8/20q Fibre Channel Switch (8 switch ports active)	AQ233A
HP StorageWorks 8Gb Simple SAN Connection Kit (8 switch ports active)	AK241A
HP StorageWorks 8/20q Fibre Channel Switch (16 switch ports active)	AK242A
Cisco MDS 9124 8-ports Active Fabric Switch	AG646A
Cisco MDS 9124 16-ports Active Fabric Switch	AG647A
Cisco MDS 9124 24-ports Active Fabric Switch	AG648A
Cisco MDS 9124e 12-port Fabric Switch for HP c-Class BladeSystem	AG641A
Cisco MDS 9124e 24-port Fabric Switch for HP c-Class BladeSystem	AG642A
Cisco MDS 9134 24-ports Active Fabric Switch	AG874A
Cisco MDS 9134 32-ports Active Fabric Switch	AG875A
Cisco MDS 9134 26-ports Active w/kit for 48 port solution	AJ732A
Cisco MDS 9134 34-ports Active w/kit for 64 port solution	AJ733A
MDS 9222i Multiservice Modular Switch w/0 SFPs	AG851A
Cisco MDS 9216i w/o Ethernet SFP switch	AE390A
Cisco MDS 9216i	AE390A
MDS 9506 Director with Supervisor 2	AE388A
MDS 9509 Director with Supervisor 2	AE389A
MDS 9513 Director with Supervisor 2	AE376A
MDS 9513 Director with Fabric 2 Module	AJ905A

Configuration Information

Fibre Channel Cables	2 m LC-LC Multi-Mode Fibre Channel Cable	221692-B21
	5 m LC-LC Multi-Mode Fibre Channel Cable	221692-B22
	15 m LC-LC Multi-Mode Fibre Channel Cable	221692-B23
	30 m LC-LC Multi-Mode Fibre Channel Cable	221692-B26
	50 m LC-LC Multi-Mode Fibre Channel Cable	221692-B27
	2 m LC-SC Multi-Mode Fibre Channel Cable	221691-B21
	5 m LC-SC Multi-Mode Fibre Channel Cable	221691-B22
	15 m LC-SC Multi-Mode Fibre Channel Cable	221691-B23
	30 m LC-SC Multi-Mode Fibre Channel Cable	221691-B26
	50 m LC-SC Multi-Mode Fibre Channel Cable	221691-B27

Step 5 - Choose Rack Options

Select each required option with quantities specified.

Rack Cabinet, Customer Assembled	
5642 - 5000 Series rack	358254-B21
14U rack	
HP S10614 Rack with Shock Pallet	292302-B22
Rack Cabinets 10622 G2	
10622 G2 Universal Rack w/Shock Pallet	AF022A
10622 G2 Universal Rack w/Standard Pallet	AF021A
Rack Cabinets under 10636 G2	
10636 G2 (36U) Rack Cabinet - Pallet	AF011A
10636 G2 (36U) Rack Cabinet - Shock Pallet	AF012A
10636 G2 (36U) Rack Cabinet - Crated	AF013A
10636 G2 (36U) Rack Cabinet, with Extension - Shock Pallet	AF014A
Rack Cabinets 10642 G2	
10642 G2 (42U) Rack Cabinet - Pallet	AF001A
10642 G2 (42U) Rack Cabinet - Shock Pallet	AF002A
10642 G2 (42U) Rack Cabinet - Crated	AF003A
10642 G2 (42U) Rack Cabinet, with Extension - Shock Pallet	AF004A
Modular Cooling System G2 (MCS G2)	AF025A
MCS G2 10642 G2 Expansion Rack	AF026A
Rack Cabinets 10842 G2	
10842 G2 Universal Rack w/Shock Pallet	AF042A
10842 G2 Universal Rack w/Standard Pallet	AF041A
Rack Cabinets 10647 G2	

10647 Rack G2 Pallet	AF031A

MSA2000fc G2	POWER REQUIREMENTS	
	Input Power Requirements (typ)	110 VAC 3.6A/394W; 220VAC 1.9/385W
	Max Input Power	100-240 VAC, 50/60 Hz., 4.5-1.9A; 48-60 VDC 10.4A/8.3A
	Heat Dissipation	1622 BTU/hr
	TEMPERATURE AND HUMIDITY RANGES	
	Operating Temperature	41°F to 104°F (5oC to 40°C)
	Shipping Temperature	-40°F to 158°F (-40°C to 70°C)
	Operating Humidity	10% to 90% RH @ 104°F (40°C) non-condensing
	Non-Operating Humidity	Up to 93% RH @ 104°F (40°C)
	DECLARED ACOUSTIC NOISE LEVELS	
	Sound Power	< 6.5 Bels
	Sound Pressure	< 57 dBA
	SHOCK AND VIBRATION	
	Shock, Operational	5G's for 11 milliseconds, half sine
	Shock, Non-Operational	15G 11ms half sine
	Vibration, Operational	5-500Hz, 0.21Grms flat spectrum0.000089g2/HZ Random Vibration
	Vibration, Non-Operational	5-500-5Hz, 0.5 G peak to peak, sinusoidal
	PHYSICAL	
	Height	3.436 in/ 8.727 cm
	Depth (excluding cables) (back of ear to back of controller handle)	MSA2024: 20.28 in / 51.510 cm MSA2012: 21.8 in. / 55.372 cm
	Width (body only)	17.55 in / 44.58 cm (w/ ears 19 in / 48.26 cm)
	Chassis Weight (no controllers)	MSA2012 chassis: 44 lbs. MSA2024 chassis: 43 lbs

Modular SAN Array 2300fc G2 Controller	User Interface	- Status and activity provided via management interfaces Status Indicators on front of Controller
	RAID Support	0, 1, 3, 5, 6, 10, 50
	Cache Memory	1GB Read/Write. ECC protection with backup to Flash memory (indefinite backup)
	Cache Backup	ECC protection with back up to flash memory (indefinite backup)
	Upgradeable Firmware	yes
	Disk Drive and Enclosure Protocol Support	3 Gb SAS - Serial Attached SCSI / 3 Gb SATA II
	Expansion Port	MSA2000fc SAS (SFF8470) 4x lane 3 Gb SAS MSA2300fc SAS (SFF8088) 4x lane 3 Gb SAS

Technical Specifications

Regulatory	Safety	UL 60950-1 (USA)
		CAN/CSA-C22.2 No.60950-1-03 (Canada)
		EN 60950-1 (European Union)
		IEC 60950-1 (International)
	Electromagnetic Compatibility	VCCI:2008-04 Class A
		ICES-003 Issue 4 Class A (Canada)
		EN55022 : (European Union Class A); CISPR 22 (International)
		EN61000-3-2 : (Harmonics)
		EN61000-3-3 : (Flicker)
		EN 55024 (European Union, Immunity);CISPR 24 (International Immunity)
		CNS 13438 Taiwan
		KN22 Class A (Emissions); KN24 (Immunity)
	RoHS and WEEE	RoHS-5 Compliance, China RoHS, WEEE
	Country Approvals	Australia/New Zealand, Canada, China (PRC), European Union, Germany (GS Mark), Japan, South Korea, Taiwan, United States

© Copyright 2009 Hewlett-Packard Development Company, L.P.

The information contained herein is subject to change without notice.

Microsoft and Windows NT are US registered trademarks of Microsoft Corporation. Intel is a US registered trademark of Intel Corporation. Unix is a registered trademark of The Open Group.

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.